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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
CHAUHAN, ULKA J

ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 11/29/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/056,656	Applicant(s) PRIEM ET AL.	
	Examiner Ulka J. Chauhan	Art Unit 2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 October 2001* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *42-61,70-81 and 90-99* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *42-49,51-59,61,70-78,80,81,90-96,98 and 99* is/are rejected.

7)☒ Claim(s) *50,60,79 and 97* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Claims 62-69 and 82-89 are cancelled and claims 90-99 are newly added. Claims 42-61, 70-81, and 90-99 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 42-44, 52-54, 70-73, 81, 90, 91, and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,987,567 to Rivard et al and U.S. Patent No. 6,259,460 to Gossett et al.**

5. As per claims 42, 44, 52, 54, 70-72, 81, 90, and 99, Rivard teaches a computer system 600 comprising a bus 620 coupled to a CPU 605 and a graphics accelerator 635 at Fig. 6. Rivard discloses that the graphics accelerator includes graphics pipeline stages including texture mapping stage 645 and a texel cache system 650 comprising cache tags 1010,1015 and cache

data store 1030 at col. 6 lines 22-26. Rivard further discloses that the cache tag blocks 1010, 1015 determine whether requested texel values are stored in the cache data store 1030 and include LRU engines to compute the least recently used cache address at col. 6 lines 39-40 and col. 7 lines 49-55. Rivard does not expressly teach a DMA engine that retrieves texel data from memory. Gossett teaches a graphics system comprising a texture unit which loads textures using a DMA engine at col. 4 line 61-col. 5 line 15, col. 7 lines 18-22, and col. 10 lines 31-35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Rivard and Gossett such that the graphics accelerator of Rivard's invention is made to include a DMA engine as taught by Gossett whereby the texture data is retrieved from memory using DMA for faster data retrieval.

6. As per claims 43 and 53, Rivard discloses that the texture memory is fully associative at col. 7 lines 30-32.

7. **Claims 45, 46, 48, 49, 51, 55, 56, 58, 59, 61, 74, 75, 77, 78, 80, 92, 93, 95, 96, and 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,987,567 to Rivard et al. and U.S. Patent No. 6,259,460 to Gossett et al. and U.S. Patent No. 5,790,130 to Gannett.**

8. As per claims 45, 55, 74, and 92, Rivard does not explicitly teach that texture values describing a polygon can not be overwritten until the polygon is completed. Gannett teaches a graphics system in which the texture mapping board 12 includes a cache memory 48 that stores texture MIP map data associated with the primitives being rendered at col. 13 lines 44-55. Gannett further discloses a replacement policy based on the priorities of texture map portions and that the highest priority is given to textures needed for newly created images and the next highest

priority given to the most recently used textures at col. 8 lines 22-28 and col. 10 line 64-col. 11 line 4. Therefore, Gannett teaches that needed textures have highest priority and are not overwritten. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Rivard, Gossett, and Gannett such that texture values for a polygons are not replaced until the polygon is completed in order to minimize the number of texture cache misses.

9. As per claims 46, 56, 75, and 93, Rivard discloses that the cache tag blocks 1010, 1015 determine whether requested texel values are stored in the cache data store 1030 and include LRU engines to compute the least recently used cache address at col. 6 lines 39-40 and col. 7 lines 49-55.

10. As per claims 48, 58, 77, and 95, Rivard does not expressly teach that the texture cache system operates in a pre-fetch mode. Gannett discloses that the front end board, texture mapping board, and frame buffer are each pipelined and operate on multiple primitives simultaneously at col. 12 lines 65-67. And Gannett discloses that texture data for any primitive is downloaded into the local memory 48 before it is needed by the primitive at col. 42 lines 38-51. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Rivard, Gossett, and Gannett such that the texture cache system of Rivard's invention is implemented to operate in a pre-fetch mode as disclosed in Gannett's invention whereby textures are pre-fetched to the texture cache data store to increase the speed of texture processing and thereby improve the overall system performance.

11. As per claims 49, 59, 78, and 96, Rivard does not expressly teach pre-fetching texels to the cache memory based on the determination that they can fit into space available in the cache.

Gannett discloses that texture data for any primitive is downloaded into the local memory 48 before it is needed by the primitive at col. 42 lines 38-51, but does not expressly teach pre-fetching based on determining available cache space. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the teachings of Rivard, Gossett, and Gannett such the that texture cache system of Rivard's invention is implemented to operate in a pre-fetch mode as disclosed in Gannett's invention whereby textures are pre-fetched to the texture cache data store. It would also have been obvious to one of ordinary skill in the art at the time the invention was made to have pre-fetched the textures only if there is available space in the cache and otherwise fetch the texels as needed so that texture processing is accelerated by caching texels when possible to increase the speed of texture processing and thereby improve the overall system performance.

12. As per claims 51, 61, 80, and 98, Rivard discloses that when a miss occurs, the LRU address is used for retrieving the texture data from the DRAM at col. 6 lines 58-56 and col. 7 lines 49-55.

13. **Claims 47, 57, 76, and 94 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,987,567 to Rivard et al. and U.S. Patent No. 6,259,460 to Gossett et al. and U.S. Patent No. 5,926,187 to Kim.**

14. As per claims 47, 57, 76, and 94, Rivard does not expressly teach a DMA engine implementing a virtual-physical address translation. Kim teaches a multimedia device 100 including a multimedia processor 200 comprising a DMA controller 255 that provides address translation at col. 2 line 64-col. 3 lines 12, col. 4 lines 26-43, and col. 9 lines 29-31. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have

combined the teachings of Rivard, Gossett, and Kim such that the graphics accelerator of Rivard's invention is made to include a DMA engine as taught by Gossett that provides address translations as taught by Kim, whereby that texture data is retrieved from memory using DMA for faster data retrieval using virtual addressing.

Allowable Subject Matter

15. Claims 50, 60, 79, and 97 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. The following is a statement of reasons for the indication of allowable subject matter: the cited prior art does not disclose or render obvious the combination of elements recited in the claims. Specifically, the cited prior art fails to disclose or render obvious the following limitations: in a graphics accelerator including a texture cache system operating in a pre-fetch mode, pre-fetching a set of texels if it is determined that the set of texels can fit into one half of the texture cache memory as per claims 50, 60, 79, and 97.

Response to Arguments

17. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

19. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 5,831,640 to Wang teaches a system for enhancing the data throughput in a texture map data retrieval subsystem.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Ulka Chauhan** whose telephone number is **(703) 305-9651**. The examiner can normally be reached Mon.-Fri. from 9:00 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Mark Zimmerman**, can be reached at **(703) 305-9798**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

22. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 305-4700.

Ulka J. Chauhan
Primary Examiner
Art Unit 2671

ujc
November 16, 2001